QUALITATIVE AMNIOTIC FLUID VOLUME DETERMINATION BY ULTRASOUND IN PREGNANCY COMPLICATED WITH HYPERTENSION AND ITS CORRELATION WITH FOETAL OUTCOME*

By

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SUMMARY

Oligamnios is an ominous sign during pregnancy and this can be detected by qualitative amniotic fluid volume (QAFV) by ultrasound. One hundred primigravidae having gestation of 30 weeks or more with known LMP and BP $\geq \frac{140}{90}$ mm of Hg constituted the study group and 40 normotensive pregnant patients with known LMP comprised the control group. The cut off point for decreased QAFV was found to be $\leq$5 cms. The number of patients with QAFV $\leq$ 5 cms was significantly more in the study group as compared to control group ($p<0.001$). There was no significant difference in the distribution of QAFV between mild and severe pregnancy induced hypertension (PIH). Significantly greater number of patients with QAFV $\leq$ 5 cms had foetal distress ($p<0.001$). Birth asphyxia was more frequent with QAFV $\leq$ 5 cms ($p < 0.05$). All cases of intrauterine growth retardation and perinatal mortality and morbidity occurred when QAFV $\leq$5 cms.

Introduction

Hypertensive disorders complicating pregnancy are well known causes of perinatal mortality and morbidity. They are associated with intrauterine growth retardation depending on duration of hypertension, presence of proteinuria and underlying vascular disease. Intrauterine growth retardation, post maturity and major foetal anomalies of urinary tract are associated with oligamnios. Oligamnios is an ominous sign during pregnancy, no matter when it occurs. It is associated with foetal acidosis, meconium aspiration and low apgar scores. Accurate antepartum estimation of amniotic fluid volume is exceedingly difficult, but with current dynamic ultrasound methods, the amniotic fluid volume can be readily measured by semiquantitative means. The present study was undertaken to detect the foetus at risk in pregnancy complicated with hypertension by determining the qualitative amniotic fluid

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volume (QAFV) and correlating the findings with foetal outcome.

Material and Methods

A total of 140 primigravidae attending the antenatal clinic and from antenatal wards of Smt. Sucheta Kriplani Hospital were selected for this study:

(a) Study group: This comprised of 100 patients, criteria for selection being known last menstrual period, period of gestation 30 weeks or more and BP recording of > 140/90 mm of Hg with or without albuminuria i.e. (PIH).

(b) Control group: This consisted of 40 normal pregnant patients who fulfilled the above criteria except that they were normotensive without proteinuria.

In all cases, detailed history was taken and clinical examination made. QAFV was determined by a linear array real time ultrasound with a 3.5 MHZ transducer. Pockets of amniotic fluid were identified and the largest pool of amniotic fluid pocket was measured vertically by freeze frame mode and electronic callipers. In both the groups, clinical and ultrasound examinations were repeated every 2 weeks till 36 weeks and then once a week till delivery. The management of patients, both study and control group was left entirely to the treating obstetricians. Results of ultrasound examination was not available to them. Intra-partum record was kept. Maturity of newborn was assessed according to criteria laid down by Narayanan and Gujral (1981). Mother and baby were followed up till their stay in the hospital. The ultrasound results were correlated with foetal outcome.

Observations and Results

Pattern of distributions of QAFV is shown in Table I. Table II shows the mean QAFV at different period of gestation. A gradual diminution of QAFV was seen in both groups from 30 weeks onwards, the decrease being more in the study group.

Frequency distribution of QAFV is shown in Table III and from this, cumulative percentile graph was drawn for study and control group (Fig. 1). The

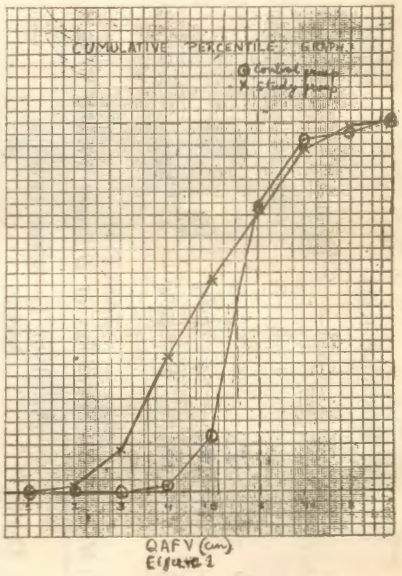

Fig. 1

cut off point was taken at the area of maximum difference. This was at QAFV ⩽ 5 cms and redistribution of data was done as in Table IV. The number of patients with QAFV ⩽ 5 cms was significantly higher in the study group as compared to the control group ($p < 0.001$). The number of patients with severe pregnancy induced hypertension (PIH) having QAFV ⩽ 5 cm was not significantly different from cases having

TABLE I

QAFV: Pattern of Distribution

		QAFV: POCKET (cm)																	
	Total	<1		1.1-2		2.1-3		3.1-4		4.1-5		5.1-6		6.1-7		7.1-8		8.1-9	
Control	40	—	—	—	—	—		1	2.5%	5	12.5%	25	62.5%	7	17.5%	1	25%	1	2.5%
Study	100	—	—	1	1%	10	10%	26	26%	20	20%	20	26%	15	15%	6	6%	2	2%
Mild	80	—	—	—	—	3	3.8%	24	30%	16	20%	17	21.3%	13	16.2%	5	6.3%	2	2.5%
Severe	20	—	—	1	5%	7	35%	2	10%	4	20%	3	15%	2	10%	1	5%	—	—

TABLE II

Mean QAFV Readings at Different Periods of Gestation

	Period of Gestation (weeks)						
	30-32	32-34	34-36	37	38	39	40
Longitudinal							
Control (19)	7.2 ± 0	6.3 ± 0.16	5.8 ± .53	5.5 ± .74	5.4 ± .25	5 ± .07	4.4 ± 0.1
Study (38)	6.6 ± 0	6 ± 0.42	5.6 ± .78	4.8 ± .53	4.7 ± .26	4.6 ± .54	—
Cross-sectional							
Control (40)	7.2 ± 0	6.3 ± 0.16	6.2 ± 0.5	6 ± 0.5	5.6 ± 0.3	5.2 ± 0.5	4.6 ± 0.6
Study (100)	6.6 ± 0	6 ± 0.42	6.0 ± 0.6	5.1 ± 0.3	4.9 ± 0.4	4.7 ± 0.2	—

TABLE III

QAFV: Pattern of Distribution: Cumulative Frequency Table

	QAFV (cm)								
	<1 cm	<2 cm	<3 cm	<4 cm	<5 cm	<6 cm	>7 cm	<8 cm	<9 cm
Control (40)	—	—	—	1 (2.5%)	6 (15%)	31 (77.5%)	38 (95%)	39 (97.5%)	40 (100%)
Study (100)	—	1(1%)	11(11)%	37 (37%)	57 (57%)	77 (77%)	92 (92%)	98 (98%)	100 (100%)

mild PIH ($p < 0.5$). Hence both these groups i.e. severe and mild PIH were taken together for further analysis.

QAFV and foetal distress

Foetal distress was significantly more in those with QAFV $\leqslant$ 5 cms as compared to those with QAFV>5 cms ($p<0.001$) (Table V). When foetal distress was compared between those with QAFV 1.1-2 cms and 2.1-3 cms; 2.1-3 cms and 3.1-4 cms; 3.1-4 cms and 4.1-5 cms; 4.1-5 cms and 5.1-6 cms, significant difference was found only between 4.1-5 cms and 5.1-6 cm ($p < 0.001$) (Table VI).

QAFV and onset of labour and mode of delivery (Table VIII)

Incidence of induced labour was significantly higher ($p < 0.001$) with QAFV < 5 cms. Spontaneous labour was significantly more common with QAFV > 5 cms ($p < 0.01$).

QAFV and birth asphyxia (Table IX)

Birth asphyxia occurred significantly more with QAFV $\leqslant$ 5 cms as compared to those with QAFV > 5 cms ($p < 0.05$).

TABLE IV
Qualitative Amniotic Fluid Volume: Grouping the Pattern of Distribution

	<5 cm QAFV		>5 cm QAFV		Total	
	No.	%	No.	%	No.	%
Control group (40)	6	15	34	85	40	100
Study group (100)	*57	57	*43	43	100	100
Mild (80)	**43	53.9	37	46.1	80	100
Severe (20)	**14	70	6	30	100	100

* $X^2 = 20.35$ $p < 0.001$.
** X^2 = not significant 1.72 ($p < 0.5$).

TABLE V
QAFV and Foetal Distress Grouping

	<5 cm QAFV		F.D.		>5 cm QAFV		F.D.	
	No.	%	No.	%	No.	%	No.	%
Control	6	15	3	50	34	85	—	—
Study	57	57	*21	36.8	43	43	*1	2.3

* $X^2 = 17.01$ ($p < 0.001$).

QAFV and foetal maturity at birth (Table VII)

Labour prior to 37 weeks, spontaneous or induced was significantly more in the group with QAFV $\leqslant$ 5 cms ($p < 0.01$).

QAFV and foetal growth (Table X)

The babies were categorised into AGA (appropriate for gestational age), mild IUGR (—1 SD to —2 SD), severe IUGR (>—2 SD) and LGA (large for gesta-

TABLE VI

QAFV and Foetal Distress—Distribution

	<1		1.1-2		2.1-3		3.1-4		4.1-5		5.1-6		6.1-7		7.1-8		8.1-9	
	No.	FD	No.	FD	No.	FD	No.	FD	4.1-5		No.	FD	No.	FD	No.	FD	No.	FD
Control group	—	—	—	—	—	—	1	1	5	2	25	—	7	—	1	—	1	—
Study group	—	—	1	1	10	2	27	11	25	*10	45	*1	22	—	7	—	3	—

F.D. — Foetal distress.

* $X^2 = 17.317$ p <0.001.

TABLE VII

QAFV and Foetal Maturity at Birth

	⩽5 cm QAFV					>5 cm QAFV					
	No.	Spontaneous		Induced		Spontaneous			Induced		Elective LSCS
		<37	>37	<37	>37	No.	<37	<37	<37	>37	<37 >37
Control (40)	6	1	4	—	1	34	—	31	—	1	— 2
Studuy (100)	57	5	19	5	28	43	1	24	3	13	— 2
Total	63	*6	23	*5	29	77	**1	55	*3	14	— 4

* $X^2 = 7.1$ p <0.01.
** $X^2 = 9.04$ p <0.01.